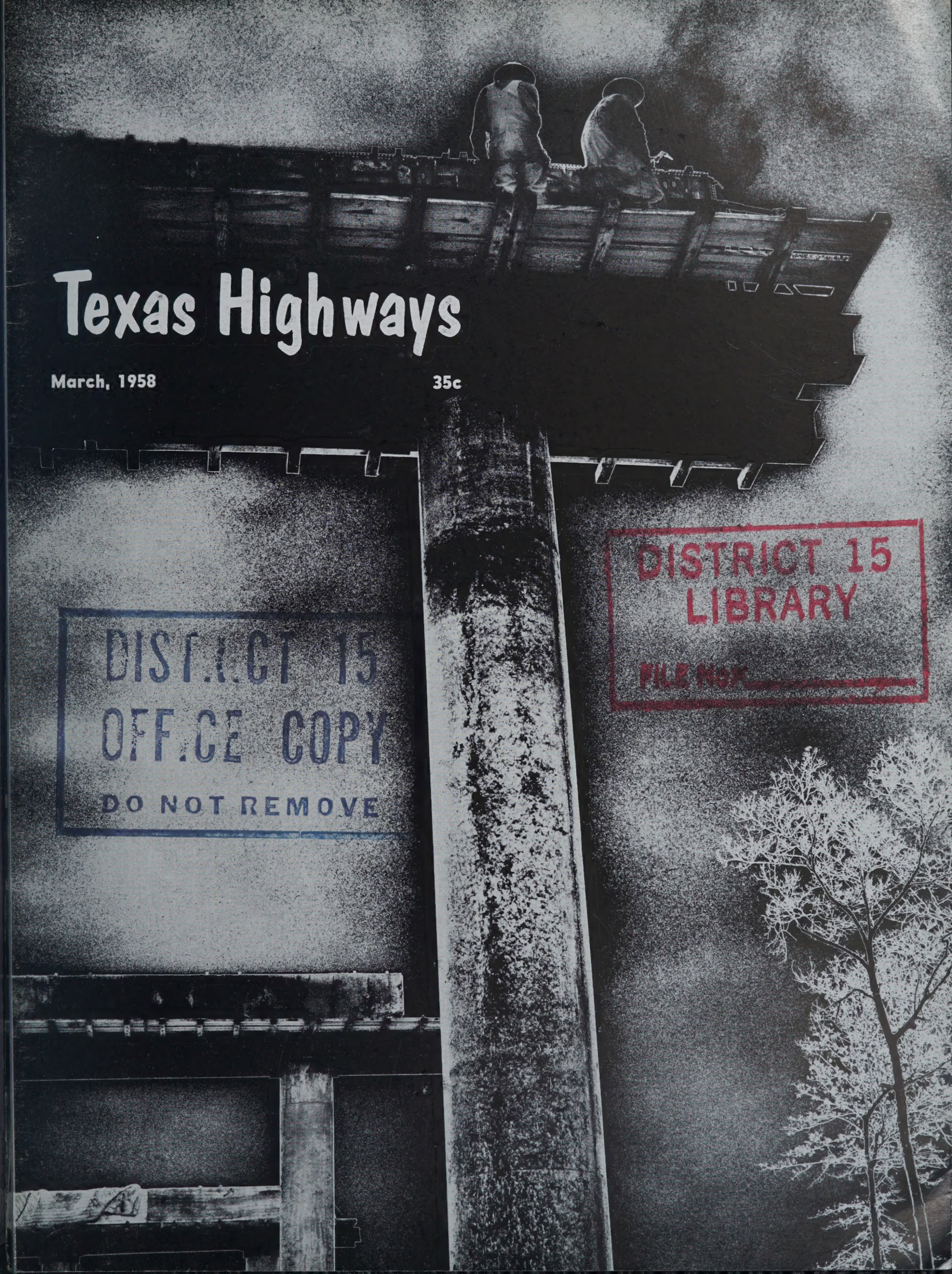

Texas Highways

March, 1958 35c

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Texas Highways

Volume 5 • Number 3

March, 1958

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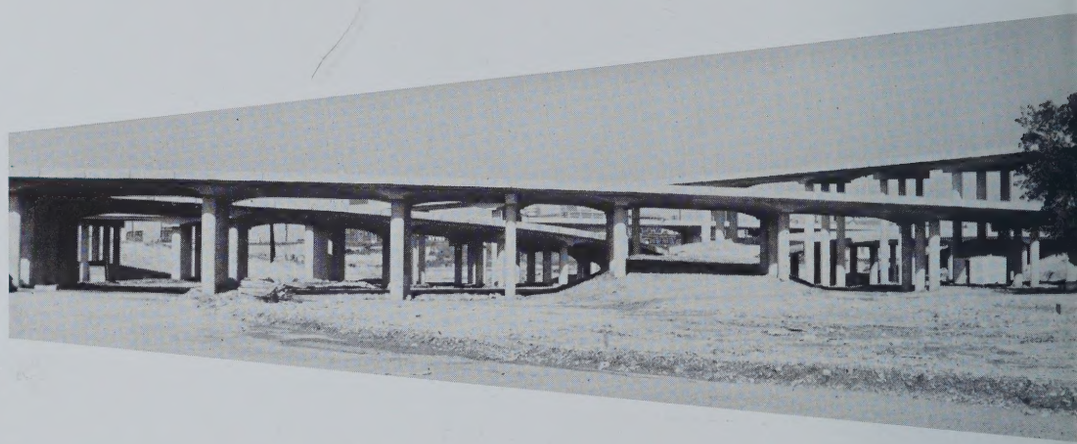
the pretzel



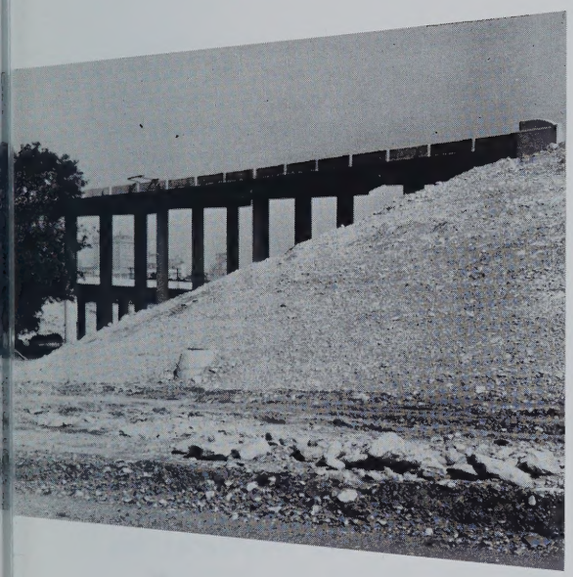
At the intersection of Interstate 20 and Interstate 35W in Fort Worth is a structure humorously called the "pretzel," or "mixmaster," by Fort Worth citizens. One look at an aerial perspective shows how this interchange got these names.

Its fame, however, comes from another cause. This is the first four-level interchange to appear on Texas highways. On this interchange, four roadways, at four levels, though not vertically directly above each other—at one point are within a 40-foot radius.

Designed prior to the establishment of current Interstate standards, this interchange was originally (1945-1947) planned as a cloverleaf with flattened loops in the two south quadrants. Right - of - way requirements were set up accordingly. Later traffic estimates in 1952 indicated the need for a direct-connection type of interchange which would handle more traffic than a cloverleaf with greater safety and convenience. The present interchange design came about as a result of the necessity for constructing the direct-connection interchange in the available right of way. This required the stacking of roadways, and comparatively steep grades and sharp curves on ramps. Acquiring more right of way was restricted by railroad tracks to the south and west, and a government housing project on the northwest.

Despite all complications, the interchange substantially meets Interstate standards. Through lanes have a design speed of 50 miles per hour, ramps—30 miles per hour. Maximum grade on Interstate 20 is 1.4 per cent. On Interstate 35W, through lanes have a maximum grade of 5 per cent —this for less than 100 feet. Ramps have a maximum grade of 7.5 per cent.

Work on this Fort Worth-Dallas, Waco-Denton highway interchange began April 27, 1956, and is scheduled for completion this month. The contractor is Austin Bridge Company and Worth Construction Com-



Looking north, Ramp A curves left; the East Lane is to the right; and the overhead ramp is Ramp C.

pany. Contract cost, not including engineering and contingencies is $1,220,000. At present, two ramp connections are open, tying the South Freeway (Interstate 35W) with the Turnpike.

Since roadways of the interchange had to be stacked to conserve space, this meant that most of the interchange would be on bridges. Continuous reinforced concrete, haunched slab-span design was chosen for several reasons. There was a shortage of structural steel and delivery was slow. The minimum headroom requirements made concrete slab spans more desirable. Concrete slabs are subject to forming to fit horizontal and verti-

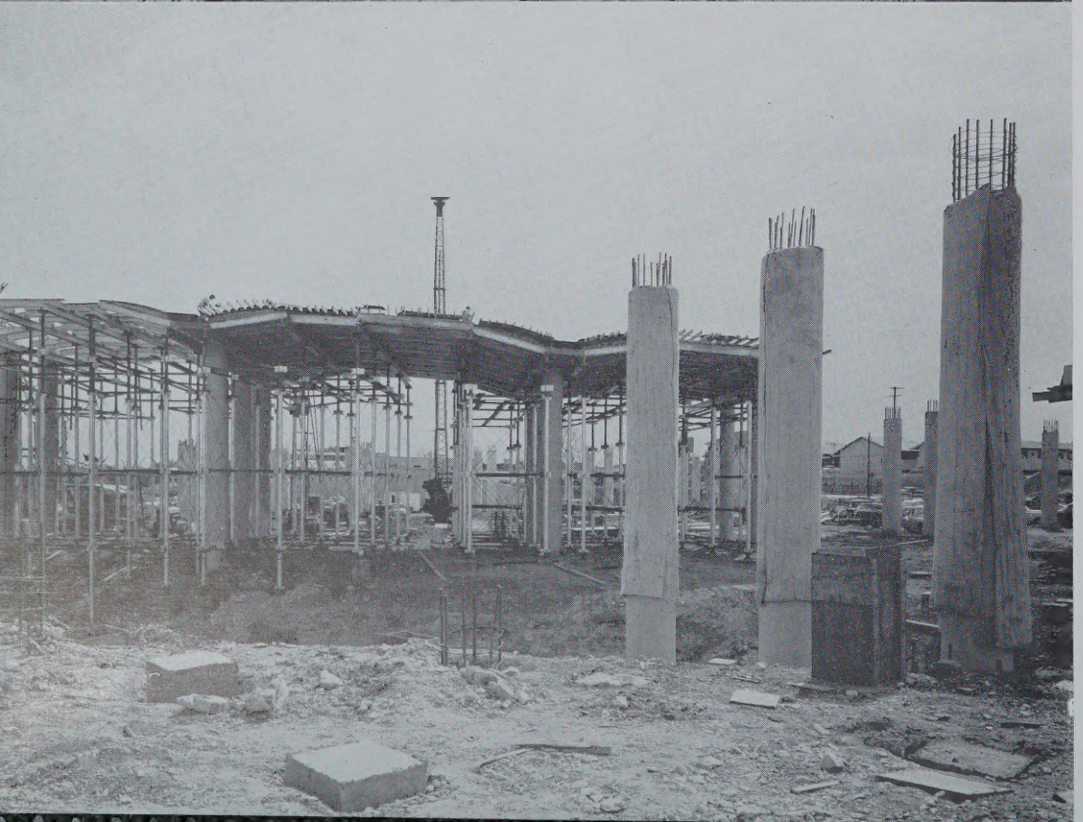
Haunching slabs over interior bents permits shallowing of slab sections at points where the maximum vertical clearance is needed.

cal curves and shifting superelevation without complex shop details. It is economical. Total contract cost of bridges averaged less than $6 per square foot of deck.

There were no long spans involved. The longest were 46 feet—14 inches thick at the center-line of span and 42 inches thick over columns. Steel girder spans were used only over Lancaster Avenue to permit erection

On the East Lane, concrete is being cast on a deepened haunch section on continuous slab units.

This uniquely adjustable steel shoring came in handy on the structure. Tops of the pipe columns were filled with sand which was then released until top plug is at the elevation desired for forming.



Forms and falsework are being set for continuous slab units on Ramp A.

with a minimum of interference to traffic.

Another reason for selection of continuous reinforced concrete slab is that the design eliminates use of caps on columns except at ends of continuous units, resulting in a saving of time and money. It carries H20-S16 loading (72,000-pound 36-ton tractor-truck with semi-trailer).

On bridges, through lanes have six-

foot emergency parking shoulders on both sides. Ramps have shoulders of three and one-half feet on each side. There are four-inch mountable curbs on both sides of the roadways, and nineteen-inch concrete parapet walls at edges of shoulders with single aluminum rail on top (three-feet above the shoulder).

Approaching roadways from the south, east, and north are three

Steel girders span the four Lancaster Avenue crossings of the Interchange. Steel was used here to avoid closing the heavily traveled Lancaster Avenue.

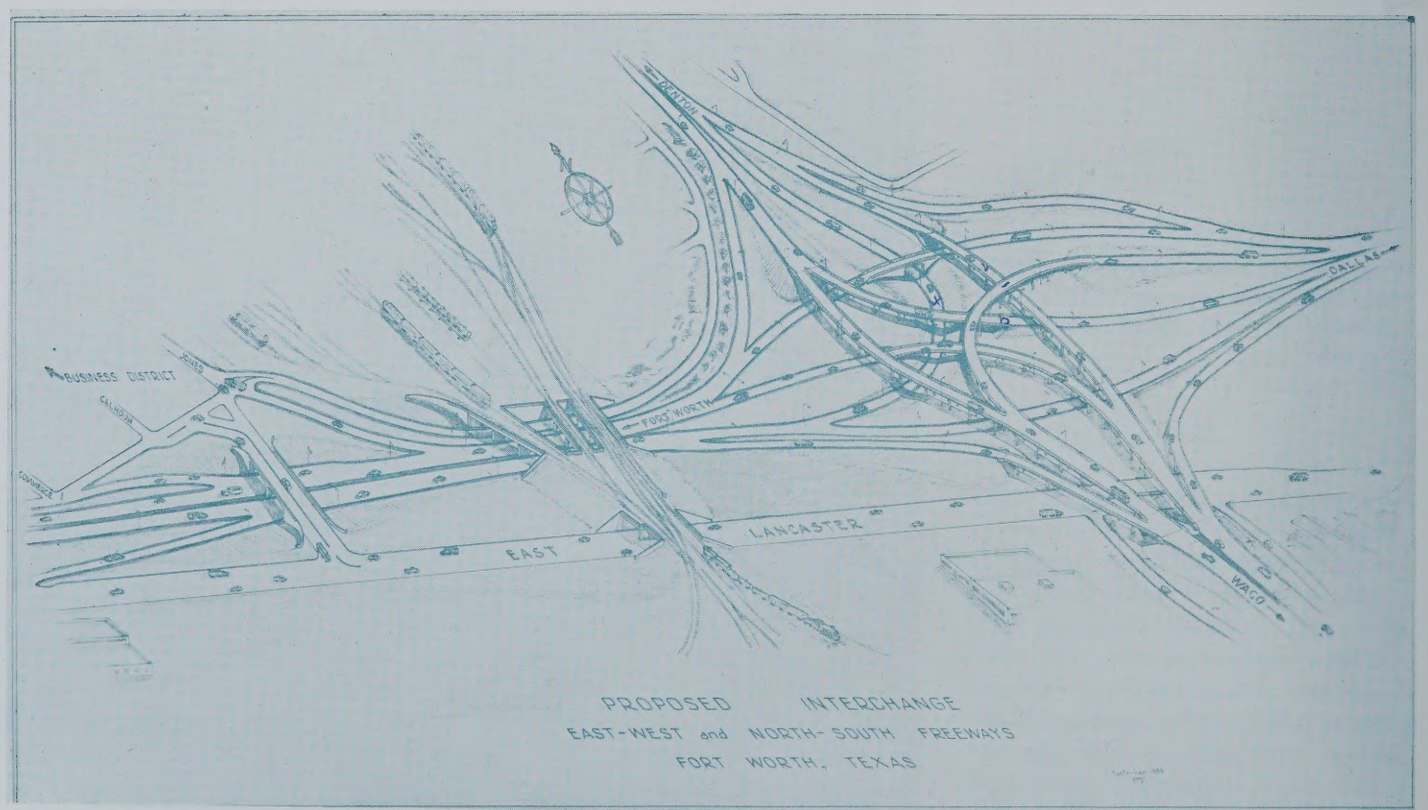
The first steel girder spans go on Ramp F over Lancaster Avenue.

The skeleton of reinforcing steel for the parapet wall belies the strength it will offer when completed.

twelve-foot lanes in each direction. From the west, to the business district, there are four lanes in each direction. Between the last exit ramps and first entrance ramps each through roadway is two twelve-foot lanes in each direction. There are four-inch mountable curbs with ten feet of emergency parking shoulder on the right. To the left, there is an eight-inch barrier curb. The mini-

The plywood decking is placed for continuous slab units.

The steel coming out of abutment at the end of a unit will fix approach slab in place.



PROPOSED INTERCHANGE
EAST-WEST and NORTH-SOUTH FREEWAYS
FORT WORTH, TEXAS

This shot, made in July of 1957, gives a view of all structures as they looked at that time.

mum for center medians is twelve feet.

Concrete pavement is ten inches thick, continuously reinforced with five-eighths-inch round longitudinal bars at eight-inch centers, and five-eighths-inch round transverse bars at sixteen-inch centers. The reinforcing steel mat is placed at mid-depth of the slab. Sawed transverse warping joints one-eighth inch wide by one inch deep are placed at fifteen-foot intervals. At a maximum of 300-foot intervals are three-fourths-inch board expansion joints with load transfer provision.

Bridge division is now working on designs for the Lancaster Avenue elevated expressway to carry the through lanes through Fort Worth, and the last contract in the east-west link should be let by August of this year.

Immediate supervision of roadway and layout design was done under Floyd L. Smith, Supervising Designing Engineer. The design of bridges, under the immediate supervision of A. M. Gordon, District Construction Engineer, was done by Herman Shaw, District Bridge Engineer; W. P. Derr, Senior Designing Engineer; and Smith Connell, Associate Resident Engineer. Engineering supervision of construction was done by Jeff S. Fox and George Black, Senior Resident Engineers.

For Soil Moisture Samples

PLASTIC BAGS

N. A. Billingsley Jr., Senior Laboratory Engineer
District 8

A solution, we believe, in the transportation of moisture samples from the job to the laboratory without loss of moisture is in the use of the plastic bag. These bags are in use on eleven jobs in this district which have controlled density of compaction in embankments and base materials. In each case, they are preferred over other types of containers.

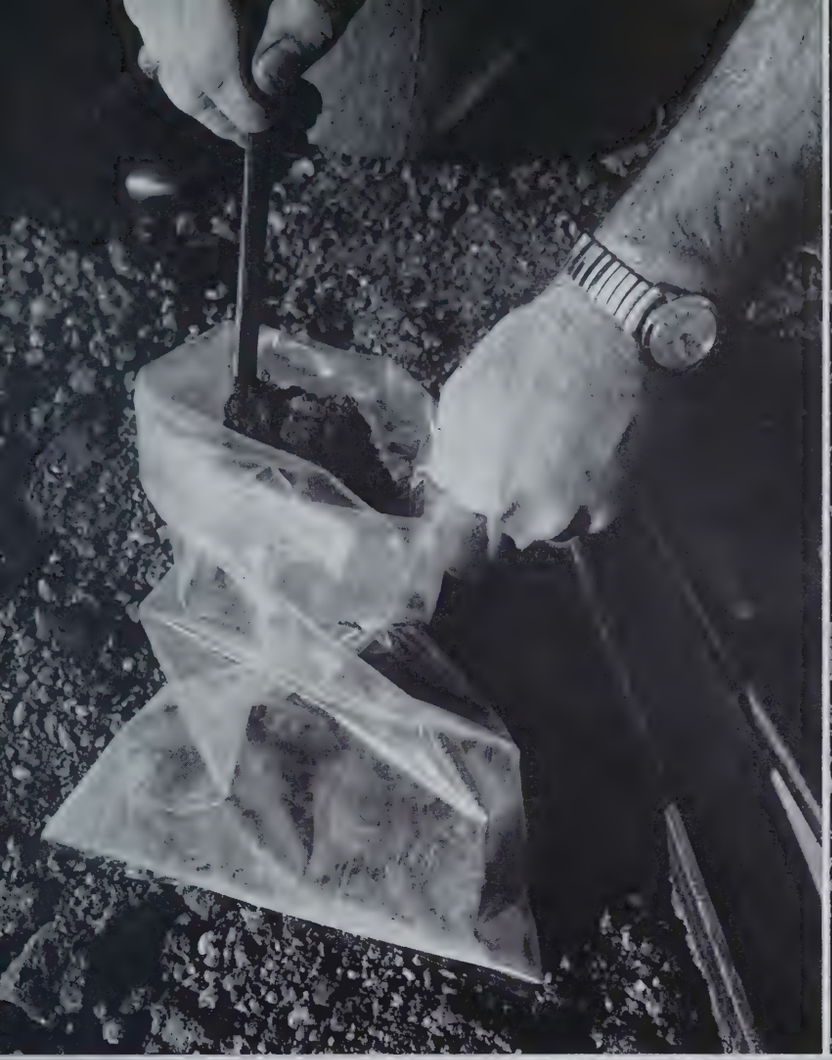
The plastic bag in use measures nine inches by eighteen inches by four-thousandths of an inch thick. They cost 5 cents each and their life, depending upon the type of soil, is very good.

Procedure for use of the bags is quite simple. After a sample is placed in the bag, it is sealed with a rubber band. The sample is weighed in the bag and removed to a pan, then placed in the oven for drying. The bag is then weighed and recorded as tare weight. (Average weight of bag and rubber band is eighteen grams.) Moisture collects on the inside surface of the bags. This can be removed by turning the bag inside out and allowing the moisture to evaporate in a few minutes; or, the bag may be dried in the oven at a temperature of something less than 140° F. It will last much longer if dried by the first method.

The bag is weighed before and after removal of moisture and the difference recorded along with the moisture in the sample. This method has been used in District 8 for two year and has proven very satisfactory.

At a test to prove their usefulness and durability, several samples of moist soil were sealed in these bags and kept under observation for 60 days. No loss of moisture was found during this period.

This is a much simpler process, and more convenient, than using a gallon bucket or similar container for packaging and transporting moisture samples. We recommend its use.



The Diesel Hammer

Horace Hoy, Soils Engineer
Bridge Division

The Diesel-powered pile-driving hammer is already a familiar sight on some of our Texas Highway Department projects, and it appears to be only a matter of time before it will become as common as the conventional steam hammer.

Photographs of the pile driver at work were made on a bridge project in progress in East Texas on State Highway 147. This prestressed concrete bridge across McGee Bend Reservoir in Angelina National Forest is being financed by the Corps of Engineers. Planning and supervision of construction lie with the Highway Department.

Pile driving is a very old technique used in preparing foundations for man's structures. The main feature has always been the utilization of a falling weight like a hammer, or a free-falling body dropping from the upper portion of a frame or tower structure. With the advent of the machine age, only the hoisting technique has improved. Hoisting methods have included the simple power-driven winch, gun powder, compressed air, steam, and the internal combustion engine.

The diesel hammer is basically a self-contained, internal-combustion engine utilizing a fully controlled working cycle of an up-and-down stroke based upon the same principles as the diesel engine. The hammer is composed of a long, vertical cylinder closed at the bottom with a movable striking head or anvil which rests on the pile cap, a heavy ram-piston, and a fuel-injection pump which is cam-actuated and gravity-fed with properly located exhaust ports.

Through development work carried out by the Germans during World War II, a diesel hammer has been produced in which endurance and rigidity have been combined to form a new tool for the construction field,

Before the diesel pile driver can go to work, a rotary rig must drill the pilot holes. Here, a crane is positioning the drilling rig.

The job supervisor directs the positioning of the rotary drilling rig. In this particular location, pilot holes had to be drilled deeper than is usually required in order to obtain minimum pile penetration called for in the plans.

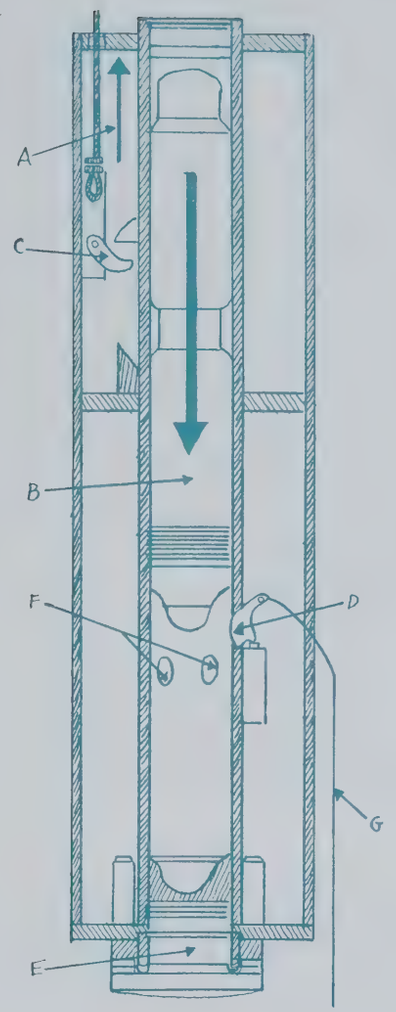
Drilling gets under way as a worker releases the clutch on the rotary drill.

according to reports from contractors. They say that mobility is outstanding. Move-on-and-off costs are minimized by the absence of a boiler or air compressor and hose. Crane size is reduced through low load requirement of the light-weight hammer for energy delivered per blow. The diesel hammer imparts a blow to the pile composed of a preloading force, impact energy, and explosive force—which extends the time duration of effort to move the pile. Consequently, the anvil and drive cap are pressed against the pile head to reduce pile-head deformation, subjecting the pile to an almost constant downward force. Energy imparted to the driven pile varies according to pile resistance. Increasing pile resistance is automatically compensated by an increasingly longer stroke resulting in additional delivered energy as needed.

Those working with the equipment feel that maintenance service is minimized. The diesel hammer has built-in fuel and oil storage which, under normal operating conditions, may last several days. So far only minor mechanical difficulties have been encountered, and a good number of these have been attributed to improper adjustment. Use of the diesel pile hammer also means a reduction in operating personnel of about two workers, according to reports.

Weather does not affect the diesel hammer any more than other types of internal combustion engines. If it is affected, the use of additives can be utilized to get it started operating easily.

Although cost of the diesel pile hammer is around one and one-half times the cost of the conventional

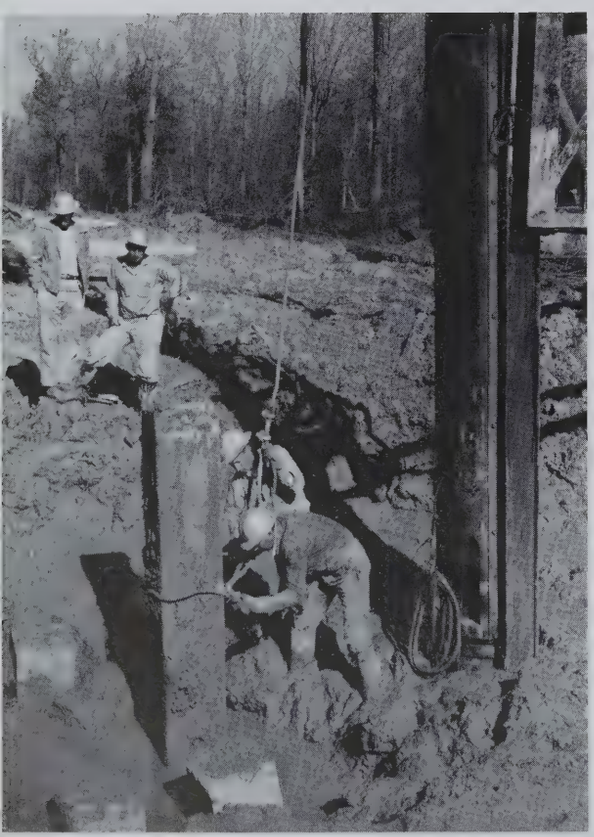


In the operation of one typical diesel hammer, the load line (A) lifts the ram-piston (B) until the trip mechanism (C) releases the ram-piston. It falls, actuating the fuel pump cam (D), which causes fuel to fall into the cup in the top of anvil (E). Continuing down, the ram piston blocks the exhaust ports (F), and compression of trapped air and fuel creates a preloading force. The gravity-propelled ram-piston strikes the anvil, delivering its impact energy to the pile. When the fuel ignites, the resultant force drives the ram-piston upward, opening the exhaust ports, and starting the cycle over. The hammer is stopped by rope (G).

steam hammer, the apparent advantages already noted, plus low fuel and oil consumption, and auxiliary equipment expense contribute to great savings which are expected to eventually be reflected in our highway bid prices. The diesel hammer is currently being permitted on a job-to-job basis with special approval given upon receipt of written requests.

Two cranes can be seen in this picture. The rig in the foreground is drilling a pilot hole as the rig in the background is positioning the hammer and leads on a pile ready to be driven.

In fitting the diesel hammer onto the pile, the vertical axis of the leads and hammer are positioned to coincide with the vertical axis of the pile.



As pilot holes are drilled, piles are placed and driven to plan grade. A worker removes the cable used in lowering this pile. Piling around it have already been driven to grade.

Sometimes it's a muddy job, but work goes on, with the pile driver hammering away at the pile.

The pile hammer slides down the leads as the pile is driven into the ground. All its workings are contained on the inside of the hammer. From the outside, the only things apparent are the smoke and sound.

The work is a continuous operation. After one pile is driven to plan grade, the diesel hammer moves on to the next pilot hole—and the drilling rig has moved ahead to the next location.

Bents in place await prestressed beams. Next month's magazine will carry a story on how these beams are made.

The next step after piling is driven to plan grade is the construction of bents. Here, the crew checks alignment of bents before forms are removed.

32nd Short Course

The Thirty-second Annual Highway Short Course was held February 25-26 under the direction of the School of Engineering, Department of Civil Engineering, and the Texas Transportation Institute of A. & M. College in cooperation with the Texas Highway Department. Those attending the meeting in College Station heard a welcome address by Fred J. Benson, Dean of Engineering, Texas A. & M. College, and a response by D. C. Greer, State Highway Engineer. The group was then addressed by Marshall Formby, Chairman of the Highway Commission, and Herbert C. Petry Jr. and C. F. Hawn, members of the Commission.

Preceding the Short Course on February 24, Division Heads, District Engineers, and key personnel gathered for the District Engineers' meeting. Special guests at the meeting were seventeen former Division Heads and District Engineers who are now retired.

The State Highway Engineer presided at the D. E. meeting and discussed with the group the progress made on the Interstate Highway program, and other departmental activities. Greer said that Texas has completed 222 miles on the Interstate system—the largest number of miles yet completed by any state. It represents one-sixth of the total mileage completed in the nation. He said that Texas has over 436 miles of Interstate Highway in which the contracts have been awarded at a cost of approximately $135 million.

The State Highway Engineer signaled out the maintenance forces for the fine work they were performing in keeping Texas highways among the best maintained in the nation. Our maintenance people, who are often on duty around the clock during inclement weather, said Greer, are one of our best mediums for promoting good public relations.

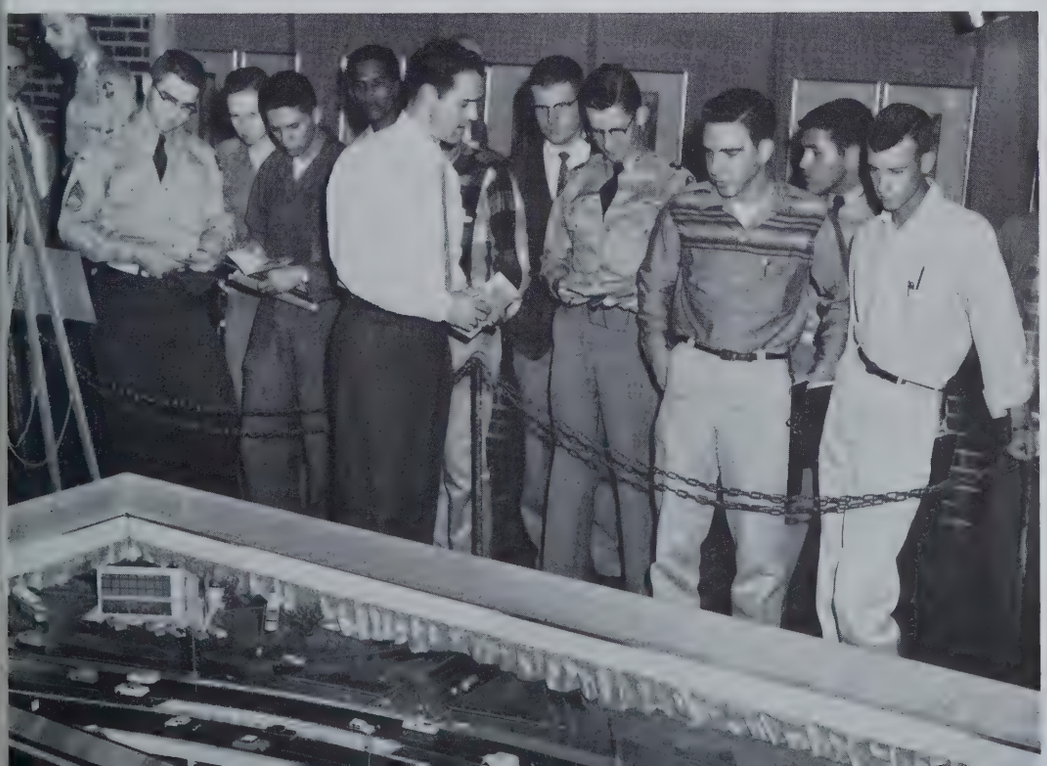
A record attendance at the Thirty-second Annual Short Course kept registration lines long. Next year's Short Course has been set up for March 10, 11, and 12.

J. A. Waller, Chief Engineer of Maintenance Operations, acted as chairman for the session on Maintenance Operations. Seated at the table as members of a panel on Radio Communications Performance, Status, and Planning, are moderator A. J. Sherrod, Lawrence Magee, R. A. Scott, J. R. Long, and R. C. Liles.

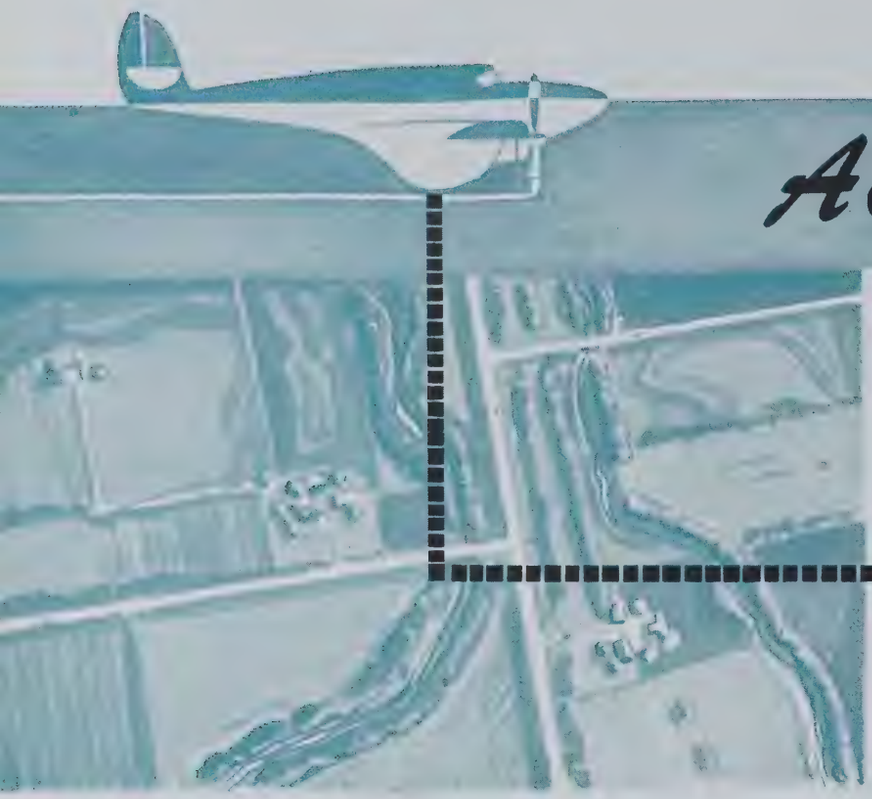
Men from the far corners of the state have a chance to mingle and visit between sessions.

500 YEARS OF HIGHWAY ENGINEERING . . . *Special guests of the Thirty-second Annual Short Course were former District Engineers, Division Heads, and State Highway Engineers with years of employment with the Department totaling 499.23. Bottom row, left to right, are John Nabers, Tom Kelly, Gus Bracher, A. C. Love, George Edwards, S. J. Treadaway, Don Neer, and George Garrett. On the second row are J. L. Dickson, Tom Davis, Ben Freeborough, Bob Killmer, W. W. Finley, Jim Douglas, Frank Maddox, Tom Huffman, and Gibb Gilchrist.*

Receiving recognition at the Short Course are the Highway Department's prize-winning Buffalo Bayou Bridges in Houston. Accepting awards from Horace E. Perry, Director, American Institute of Steel Construction, are State Highway Engineer D. C. Greer, for the owner—the Highway Department, and Charles Matlock of the Bridge Division, for the designers—Bridge Division. The plaque in the middle will appear on the bridges in Houston.



Cadets look over the Highway Department exhibit at the Short Course, manned by Bob McCarty of Information and Statistics Division.



Aerial Oblique photography for illustrative purposes

H. F. Hilgers, Supervising Designing Engineer
District 15

The present-day highway construction program is requiring the engineer to enter the field of public relations and sales promotion to an extent never dreamed of before. The average highway project has to be sold to the local governmental agencies, civic organizations, and general public before it can advance to the preliminary design stage. This fact has recently been brought out in the Federal Aid Highway Act of 1956, whereby a public hearing is required on all highway improvement projects through a city, town, or village where federal funds will be spent. State H. B. 620 further requires that a public hearing be held on all projects involving State funds for the purchase of right of way.

Oblique aerial photography, with a minimum amount of art work, can furnish the engineer with photographs of the proposed improvement long before the actual preliminary or construction work is started. It is difficult to explain to the average citizen how a proposed highway will appear upon completion, because the usual layouts, cross sections, and profiles mean nothing to the housewife, the farmer, or the man on the street.

The following general description will explain a method that can be used to show a proposed highway improvement on a medium that can be understood by the average layman. This method involves the use of aerial oblique photography with the proposed highway improvement superimposed on these photographs.

The engineer should select the section of the proposed highway he desires to use in his publicity program. This may be a short section through a critical area, or may be the over-all, long-range program for an entire urban area. Once the project to be illustrated has been selected, the angle and direction of photography should be determined.

An important fact to remember in selecting the direction of photography is that the picture must contain existing features that the layman can readily find on the photograph—such as the skyline of a large city, a school or church, an existing lake, tank, or river, or, in rural areas, a farmhouse or improvement generally known in the community. This will give the viewer something familiar with which he can orient himself, and he will avoid the lost expression often worn by the public when shown the usual plan layout of a complicated highway project.

The angle of photography should be selected to eliminate the horizon,

FIGURE (1)

Project Sketch Map (Urban Area)

and furnish enough perspective to the existing features to enable the proposed highway improvement to be superimposed with the basic perspective features. Generally this angle should be from 20 to 30 degrees.

The engineer should then prepare the project sketch map to show the area to be photographed and the angle and direction of photography. A sample of this type of map for an urban area is shown in Figure 1. The sketch map should show the important topographic features so that the aerial photographer can find the locations. The One-Inch-Equals-One-Mile Planning Survey County Map will serve very well for the sketch map in rural areas. A more detailed map should be used for urban areas. A sample of a typical rural sketch map is shown in Figure 2.

As specified under Item 33, "Photographic Prints of Oblique Aerial Photography," in the "Texas Highway Department General Specifications for Photogrammetry," the contractor will furnish the engineer contact prints of the aerial oblique photographs, similar to the photograph shown in Figure 3. This contact print should then be marked by the engineer to show the exact area to be covered by the specified enlargement. It can be marked with a red china marking pencil or masking tape. The horizontal and vertical axis of the proposed enlargement area should also be marked as indicated. See Figure 4 for an example of a marked contact print. In marking the contact print, care must be taken to provide the proper sidelap between successive pictures of an illustrated strip of highway location. The marked area of the contact print should be in the ratio of six to five.

The marked contact print is then returned to the contractor, who will prepare an enlargement of the designated area 24 by 20 inches on double-weight, matte-finish photographic paper. Care should be taken to obtain a print of medium tone. See Figure 5 for sample of the enlargement.

In the event that the engineer wants a before and after picture of the particular area, two enlargements should be specified in the aerial photography proposal. One copy of this enlargement will be the before picture.

The other enlargement will be used to show the proposed highway improvement. This enlargement should be covered with a good grade of tracing vellum. The proposed right-of-way lines are then drawn on the tracing paper, using easily identifiable topography features to determine the alignment and width. This will result in the proposed right of way being drawn to the same scale and perspective as the oblique aerial photograph.

The proposed highway lanes, drainage structures, and separations can now be drawn on the tracing paper using the known right-of-way width as an approximate scale. Structures should be drawn in perspective and care used in indicating shadows. See Figure 6 for a portion of a photograph showing an interchange structure. The draftsman should be sure the shadows drawn on the proposed improvement are in the same direction as those indicated on the photograph. The tracing-paper drawing is

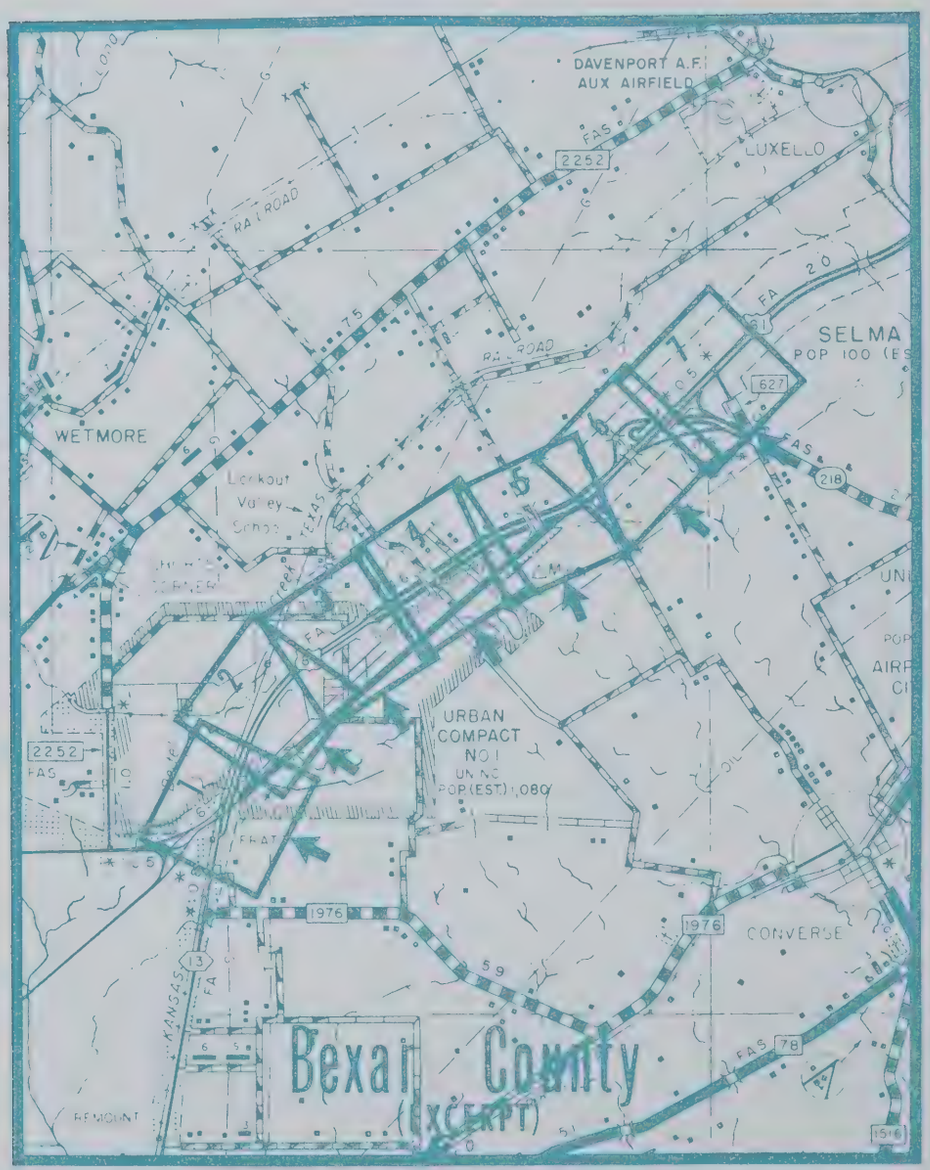


FIGURE (2)
PROJECT SKETCH MAP (RURAL AREA)

FIGURE (3)

Contact Print of Oblique Aerial Photography

FIGURE (4)

Marked Contact Print Showing Area To Be Enlarged

FIGURE (5)

Enlargement of Marked Area Shown in Figure 4. Base Map For Superimposed Highway Improvement

(Width cropped to fit page.)

then cut out along the proposed right-of-way line. An example of this tracing overlay is shown in Figure 7.

A light table will prove very helpful in preparing the tracing paper overlay and pasting this overlay on the aerial photograph. The above-mentioned table provides a glass area of 24 by 36 inches which is of sufficient size to accommodate the photographic enlargement. This overlay is then pasted on the aerial oblique photograph in its proper position, using rubber cement. The rubber cement should be placed on the photograph only, in order that the tracing overlay can be moved to secure proper positioning.

As soon as the tracing overlay has dried it should be painted to show the proposed improvements.

A water paint that can be mixed to provide the proper tone contrast to blend with the original photograph is used. See Figure 8 for the completed picture.

Street names, highways, and important topographical features should be labeled for identification purposes. These labels are prepared by using stickup letters. The characters are printed on the underside of transparent, self-adhering acetate sheets. The letters are cut from the standard sheet and stuck to a white paper background. See Figure 9 for instructions on preparing name blocks and samples of same.

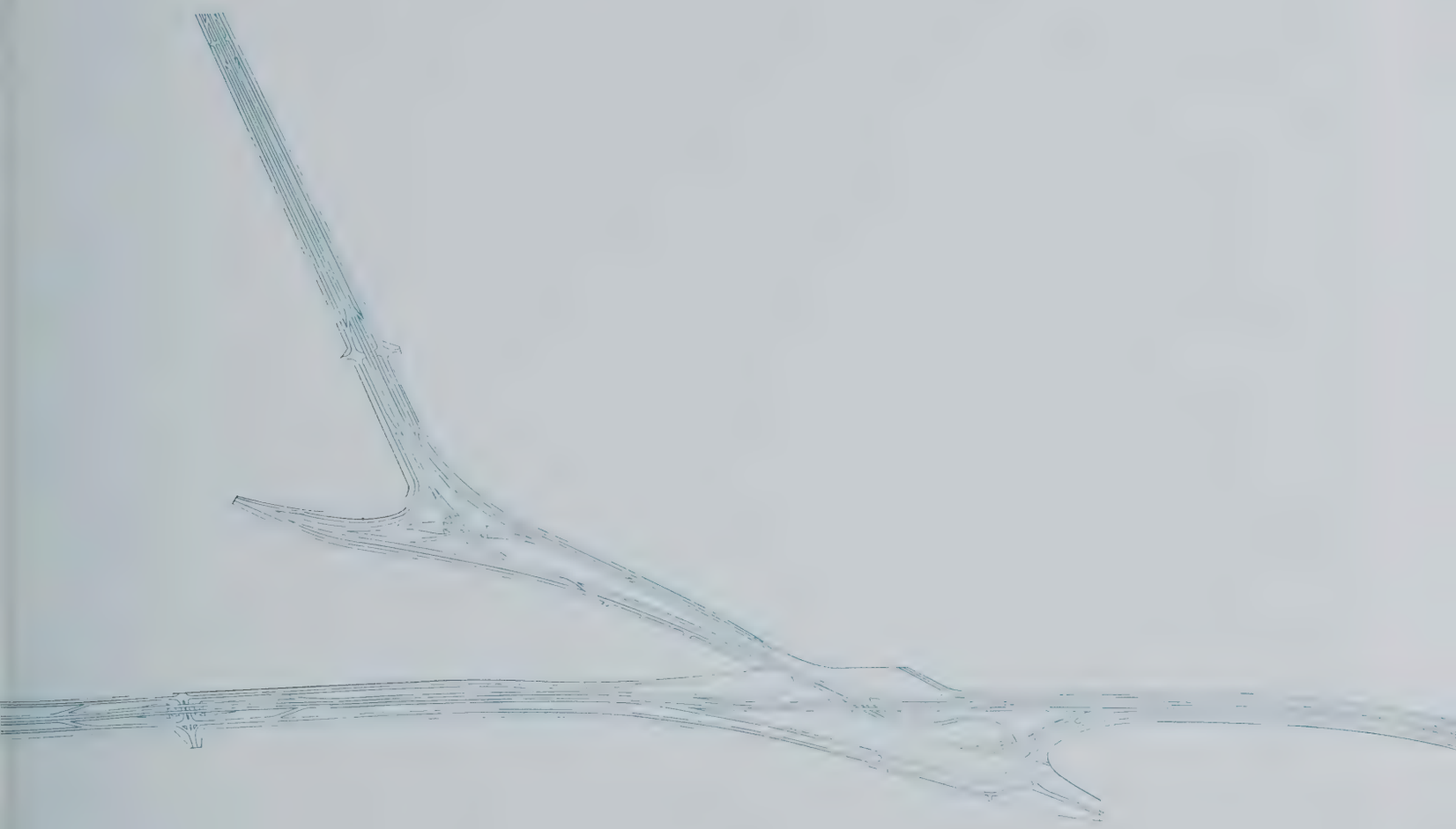
The completed photograph, with the proposed improvement superimposed and toned is labeled and sent to the Austin Office, D-21 (Reproduction Division), for copying. If the finished photograph is to be used as a display for public hearings, a 24-by-20-inch, double-matte finish photograph should be ordered. This will be a direct copy of the original photograph. In the event a projector will be used in the public hearing or meeting, the Reproduction Division of File D-21 can make the required slides. This method of presentation is very satisfactory in large meetings because the projected picture will be large enough for the entire audience to see. If the finished photograph is to be used as a newspaper illustration, a nine-by-nine glossy print should be ordered. The tone of this glossy print should not be too dark, since a picture of extremely dark tones will not produce good newspaper pictures.

The use of oblique aerial photographs of constructed portions of highways can be very useful in general progress reports written for publicity purposes. See Figures 10 and 11 for examples of oblique aerial photographs of completed highway interchanges. This same type of photograph can be made at different periods during construction operations to show the progress being made.

The oblique aerial photograph as described will be a black and white picture. If a colored photograph is desired, it can easily be made from the above-described black and white. It can be tinted with transparent oil colors.

FIGURE (6)

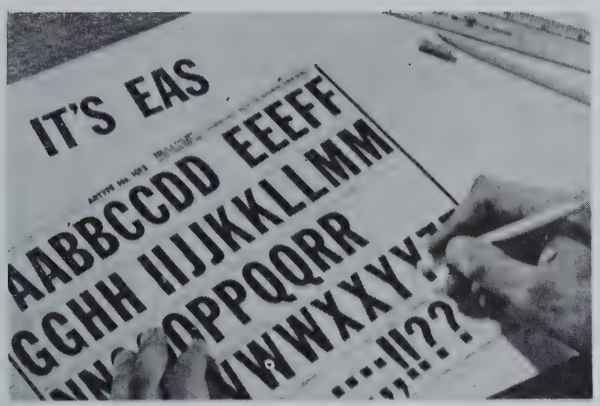
Showing Method of Indicating Proposed Structures



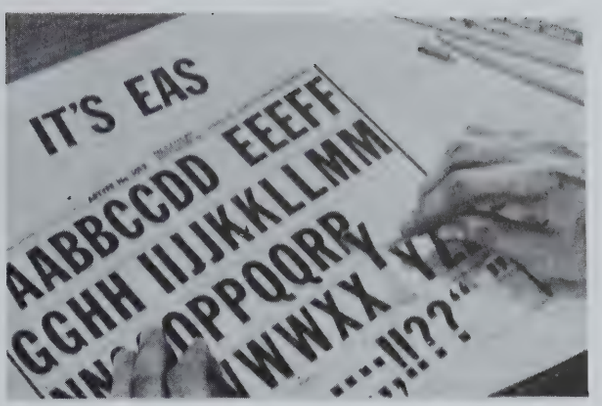
Blank Tracing Paper Overlay of Proposed Highway Improvement

FIGURE (8)

Completed Photograph Showing Propose Highway Improvement

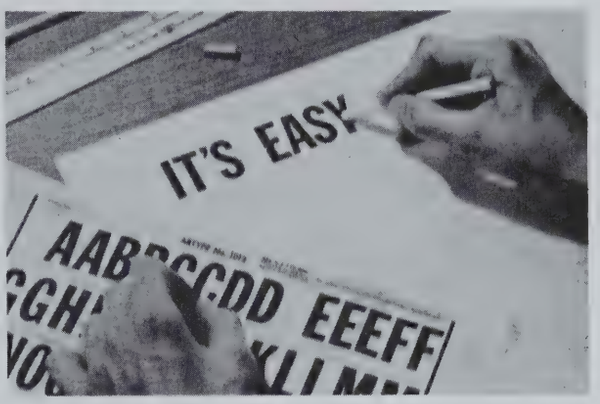


1 *Draw light blue guide on artwork or work area where lettering is required. Cut lightly but firmly with point of stylus around character desired. Include the printed guide line under each character.*



2 *Holding the stylus as shown, insert point under the character and press it against the point. It will adhere to the point and enable you to use the stylus for positioning each character.*

3 *Line up the printed Artype guide line with the drawn guide line and press the character firmly into place. Do not burnish until complete heading is in position. Changes or corrections can be easily made before the final burnishing down.*



4 *When heading is complete, use beveled edge of stylus and burnish down all of the Artype except the guide lines so that edges disappear and it seems to be printed on the artwork itself. Remove guide lines and finish burnishing.*

PLATE 3 Travis st. to Alamo st. Title Block Artype **No. 1225**

TECH HI. SCHOOL — Schools, Government Installations, Parks, & Subdivisions, Artype **No.1093**

ACME ROAD — Streets & Roads Artype **No. 1127**

U.S. HWY. 281 — Highways & Expressways **ARTYPE No. 1192**

TO HONDO — Directional Information & Date of Map Artype **No. 1126**

North Point Made By District Office

FIGURE (9)

Showing "ARTYPE" Lettering And Name Blocks

FIGURE (10)

Oblique Aerial Photograph of Completed Interchange

FIGURE (11)

Oblique Aerial Photograph of Completed Interchange

a look at tomorrow

Marjorie Mugno, Information Clerk
Information and Statistics Division

"You will be able to cross the continent in scarcely more than an hour, span the Atlantic in less than two hours and the Pacific in scarcely four hours. In the span of the next century of aviation, space ships will become commonplace for interplanetary travel . . . with speeds up to 5,000 miles per hour." These were statements made by Captain Eddie Rickenbacker, Chairman of Eastern Air Lines, recently.

Two months ago, Alton L. Blakeslee, Associated Press science reporter, noted that both American and Russian scientists are predicting the flight of man in space aboard space cruisers or platforms circling the earth.

In lieu of recent developments, speculation on highways of the future is not only desirable, but feasible. The revolution in transportation is underway, and, as Associated Pressman William Ferris said, "It is a revolution that affects the highways and will leave us a different country."

Effects of the revolution are already being felt. At the end of World War II, there were 34 million vehicles on the nation's highways. Today there are 67 million. Experts are prognosticating the presence of about 85 million vehicles a decade from now, and more than 100 million by 1975.

The avalanche of cars plus the superspeeds have taken their toll. The all-weather roads of the thirties have been outmoded. During the war years, highway construction was at a standstill. Because of the lull, roads deteriorated to such an extent that it is requiring years of good hard work to bring the standards of highways parallel to progress made by manufacturers of automobiles. (So far, highways have been designed for cars rather than cars for highways.)

The 41,000 miles of national interstate highways planned and being constructed under the 1956 Federal Aid Act will adequately carry expected traffic in the year 1976. R. E. Royall, Chief of the Research Bureau of Public Roads, has said that this delux system of interstate arteries will be long enough to encircle the globe 1 7/10 times, linking all 48 states and 209 of the nation's 232 cities of more than 50,000 population. The interstate program is setting the pace and pattern for the next two decades, but for the future, there remains only a question mark.

To reduce traffic congestion in both the street and parking facilities, the small automobile on a wheelbase of 100 inches or less is being advocated in some quarters. It is becoming more and more popular with the American public for reasons of economy. In the words of one tourist traveling in a small car, "This car will get 40 miles to the gallon and will run as fast as the law allows. Why pay extra for something you can't use?" With the expected rise in population and vehicle registration, it is unlikely that the smaller automobile would give any lasting relief except, possibly, to the pocketbook.

Because of the crowded conditions of the highways, the experts have been exploring other means to move the populace safely and swiftly. A July, 1957, issue of POPULAR MECHANICS came out with plans for Hiller's Aerial Sedan—"Your flying car for 1967." Called the "flying fan," the machine will resemble an automobile resting on short stilts, and will be based on the same principle as the ducted fan, where air is forced through the duct for flight. Operation of the machine is simple. After pushing the starter button on the instrument panel, there is a faint whine, a hum—the turbines are getting up speed—and the machine climbs effort-

lessly into the air. Although it is too early yet to quote prices or delivery dates, manufacturers hope that in ten years it will be possible to buy a four-place fan for the price of a good car.

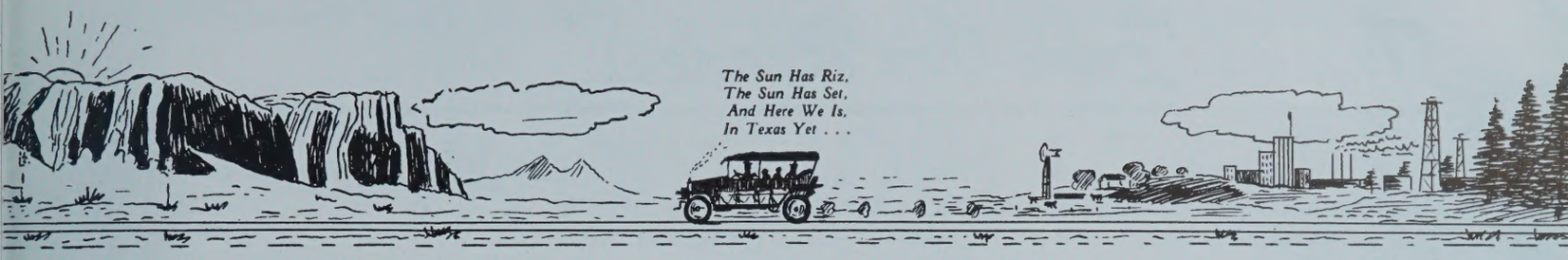
A more down-to-earth solution has been proposed by RCA Lab in Princeton, New Jersey. According to them, transportation of the future will be radar-controlled cars. The importance of this plan is that the unpredictable human element will be eliminated, lessening chances of accidents. The three essential components of this plan include a buried cable down the center of a lane with a pick-up coil on the car to receive signals; electronic loops buried in and along the roadways to alert cars of close traffic; and automatic steering and speed regulatory equipment. Radar-controlled cars will not only be less hazardous for the motorist, but will make driving a pleasure instead of a chore.

Another version of the Princeton plan was introduced in POPULAR SCIENCE, 1956, as the Dream Car of the Future. The motorist would have the privilege of retaining control of the car or turning it over to an area tower. The best speed for current traffic conditions as computed by a remote electronic brain, will be transmitted to all cars on the right half of a split television screen on the dashboard. On the left is a rear-view mirror connected to a peep-hole TV camera below the rear bumper.

In the not-to-distant future, man and science will almost certainly overcome gravity, and the predictions of Captain Rickenbacker will ring true. Then, even our interstate freeways (and the automobile) will be obsolete, especially for long-distance traveling. Only man's imagination now limits his predictions for the future: rocket-type instruments to shoot the traveler up and straight down to one's destination; portable vials for individual flight; space suits; flying boxes; ray guns to disintegrate bodies into light for instant transportation. Those believing in the Buck Rogers-type transportation of tomorrow theorize that if highways are used at all, they will probably be used for hauling heavy loads.

As the revolution in transportation affects the highways, so it understandably affects those concerned with the care and construction of our vital thoroughfares. Despite the reluctance of engineers to forecast and pinpoint the exact pattern facing our children and our children's children, engineers are positive that there will always be a need for their talents and services. Two score and ten years from now their role in the pages of progress will no doubt be different, but just as important. In line with the times, highway engineers will probably be designing, delivering, and building the launching pads, and the landing strips—or perhaps working on jobs so fantastic today they can't be visualized.

In fact, one engineer aptly stated that there are usually many more challenging jobs and problems created by the innovation of new inventions than are in force at the time. Some said that when cars were first introduced, back in the horse-and-buggy days, the blacksmith would be out of business. However, in accepting the inevitable, the blacksmith packed his anvil, closed up shop, and went to work for the automobile manufacturer. Thus, in the promising days ahead—days of adventure and advancement—there looms only one real certainty . . . what will be, will be.



OVER THE HIGHWAYS

Comments . . . from the Traveling Public

I drove across Texas in November, and I wish to compliment your Department on the attractive and useful roadside picnic tables and shelters you have recently built. We cooked our meals in traveling across country. Those tables and shelters made our stops in Texas most pleasant. We tried to leave each place as clean or cleaner than we found it.

Our humble suggestion—at each shelter have a sign indicating the number of miles to the next shelter. It would be helpful.

Edward B. Garvey
Falls Church, Virginia

Man Wanted!

Over a month ago I sent you a letter requesting if you could find me a pen-pal and I have not received any information regarding it but have received "Texas Facts" and "Official Highway Travel Map." If it is impossible for you to help me please send my address to an organization where they could help me.

I am a girl of 13 and would prefer a boy of 14 or 15.

Thanking you in advance.

(Miss) Dolores Stube
37 East 19th Street
Huntington Station
Long Island, New York

◈ *We try to fill all requests in Information and Statistics Division, but on this one we'll need a little help. All our hired hands are too old. Any of you men have sons?*

You have the poorest road directions in the U. S. highway markers. All other states show change of direction before change. There are too few markers in metropolitan areas. The entire state of Texas is one mass of detour.

Ted Sorg
Gilette, New Jersey

If you would give the western part of your state to New Mexico you would have more to boast about.

Breezewood, Pennsylvania

◈ *Was that nice?*

We liked the courtesy of Mr. Niel Cox who was so helpful, and your very good highways.

St. Louis, Missouri

We liked your good roads, excellent roadside parks. The free ferry ride at Galveston was delightful, and we got a beautiful welcome from your girl at the Information Bureau.

Mrs. Carl Hayes
Imperial Beach, California

We liked the service given us by the lady in the Information Bureau. She answered our questions courteously and gave us maps. Also liked roads, and found them well marked.

Rabat, Morocco

We liked the frequent location of parks, well-marked roads, system of widened roads at top of hills. Good highways.

Detroit, Michigan

On U. S. 80 south from El Paso the yellow no-passing lines are sometimes absent and other times not as long as they should be.

Skokie, Illinois

Put handles on your litterbags like California does.

Lorrain, Ohio

◈ *Somebody got one of our litterbags.*

Lost!

You have nice roadside parks. They are located often and are kept nice and clean. I lost a green pendant earring at the roadside park just east of Alpine. If by chance it was found I will pay a small reward.

D. Southerland
5468 The Toledo
Long Beach, California

We would like to suggest that historical spots be better marked in advance of the area. We missed San Jacinto that way. We liked everything we saw and everybody we met in Texas.

Windsor, Ontario
CANADA

We liked your good roads and the manner in which your highways are marked.

L. C. Knape
St. Paul, Minnesota

To and From Our Readers

A note about your highway magazine, which our Technical Library receives. We think its subjects and its presentation are excellent. To highway engineers, it contains many informative articles. . . .

Mark U. Watrous, Chief Engineer
Department of Highways
Denver, Colorado

I have just received the January issue of TEXAS HIGHWAYS and this publication has more sparkle and additional interest with each little issue.

Bob Gresham
Texas Tourist Court Journal
Temple, Texas

I have been informed that your State Highway Department issues an excellent highway condition bulletin. We would greatly appreciate you forwarding a copy to us, for we are interested in improving our bulletin, which is issued in tabulated form.

J. O. Bacon
State Highway Maintenance Engineer
Atlanta, Georgia

Your very good publication, TEXAS HIGHWAYS, is most interesting to me inasmuch as I am with the State Highway Department of Indiana. . . .

P. S. Murphy
Paoli, Indiana

"I've heard those kind were mighty steady... but I guess I didn't believe it!"

About the Cover . . .

The first thing that needs to be said here, for the benefit of all our engineers now having heart attacks over the honeycombed column—is—no honeycomb. This appearance of evil was not only *not* avoided by photographer Douglas Fairchild, it was brought out. According to Fairchild, this photograph utilizes the "Sabatier" effect to achieve a more powerful graphic interpretation of the subject matter. It *is* unusual. Not every day do we see what appears to be workmen welding on top of a honeycombed column as black snow falls on a white tree. The project is the McGee Bend Reservoir bridge on State Highway 147. More on this can be found on page 10.

For those with an artistic eye, what actually happens is that an emulsion is exposed, developed, washed, and given a second over-all exposure. A second development produces a partially reversed image with characteristic lines along prominent contours.

TEXAS HIGHWAY COMMISSION

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Texas Highways

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All material and manuscripts should be directed to the Editorial Office, Division of Information and Statistics, Texas Highway Department, Austin 14, Texas.

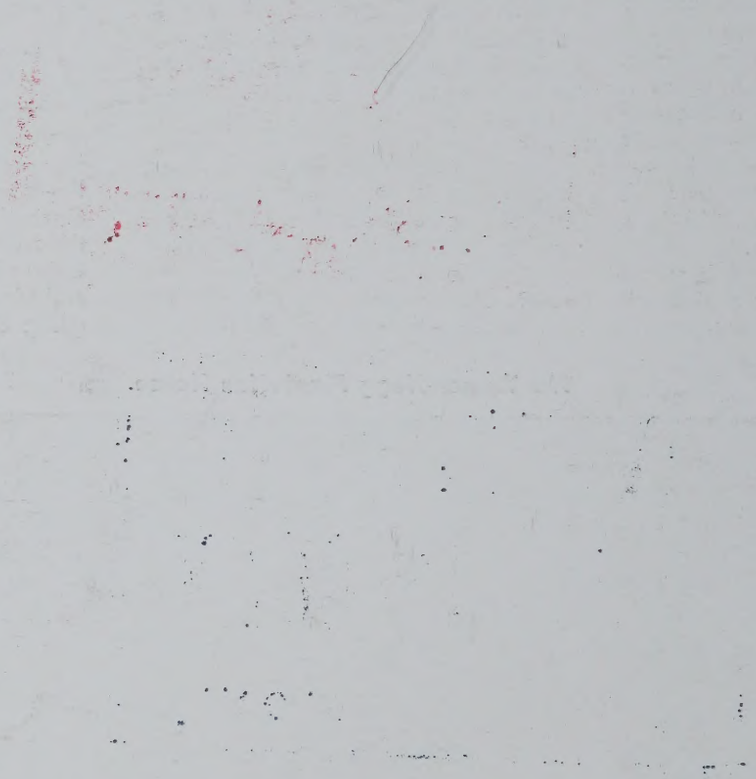
HIGHWAY SIDELIGHTS

Gordon K. Shearer
Historian, Texas State Parks Board

Motorists driving in the middle portion of the Texas Gulf Coast country will have a new state park to visit beginning March 24. It is Varner-Hogg Plantation State Park, which is on a county road about a mile and a half from West Columbia, where State Highways 35 and 36 intersect. Motorists can reach it from Houston by S. H. 35 or by driving over S. H. 288 to a junction with S. H. 35 there.

The dedication of the park is set to take place on the birthday anniversary of Texas' first native governor—James Stephen Hogg. The plantation house was his country home at the time of his death. The house and 53 acres of surrounding ground have been presented to the state by Governor Hogg's daughter, Miss Ima Hogg of Houston.

The plantation was first known as the Varner plantation. Martin Varner received title to the land in 1824 by one of the early grants of the Stephen F. Austin colony. A reproduction of the grant, photographed from the original in the Spanish Archives of the Texas General Land Office, hangs in one of the rooms of the plantation house.

Among other points of historic interest in the vicinity are the former home of Stephen F. Austin; the place of his death; the site of Jane Long's tavern; the site of the first Masonic order in the colony; the place where Mexican General Santa Anna was detained after the battle of San Jacinto; and the historic old cemetery where Josiah Bell and Madam Bell, leaders of the original group of 300 colonists, lie buried.

The Varner-Hogg Plantation House